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AUTHOR Cumming, Alister; And Others
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ABSTRACT

A study investigated the thinking processes of 14 Anglophone students of French performing challenging reading and summarizing tasks in their first and second languages. Individuals proved to use equivalent higher-order problem-solving strategies while writing and reading in both languages. Strategies varied with the individuals' levels of literate expertise in their native language, correlating with the qualities of written summaries they produced in both languages. Uses of these problem-solving strategies appeared unrelated to levels of second language proficiency (beginning and intermediate). Analyses of the verbal reports reveal thinking processes which are common to reading and summary-writing in first and second languages but which appear to vary with literate expertise and relevant knowledge. Findings are interpreted in relation to theories of the cross-linguistic interdependence of cognitive-academic skills and to a model of discourse comprehension. Implications are drawn for bilingual cognition, further research, and introduction of second language reading and writing. (Author/MSE)

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Reading and Summarizing Challenging Texts in First and Second Languages

Alister Cumming, University of British Columbia

Jacques Rebuffot, Monica Ledwell, McGill University

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mailing address: Dr. Alister Cumming
Department of Language Education
University of British Columbia
Vancouver, B.C., Canada V6T 1Z5

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Reading and Summarizing Challenging Texts in First and Second Languages

The thinking processes of 14 adult Anglophone students of French performing challenging reading and summarizing tasks were compared in their first and second languages. Individuals proved to use equivalent proportions of higher-order problem solving strategies while writing and reading in both languages. These varied with people's levels of literate expertise in their mother tongue, correlating with the qualities of written summaries they produced in both languages. Uses of these problem solving strategies appeared unrelated to participants' levels (beginning and intermediate) of second language proficiency. Analyses of the verbal reports reveal thinking processes which are common to reading and summary writing in first and second languages but which appear to vary with people's literate expertise and relevant knowledge. Findings are interpreted in relation to Cummins' (1984) theories of the cross-linguistic interdependence of cognitive-academic skills and Van Dijk and Kintsch's (1983) model of discourse comprehension. Implications are drawn for theories of bilingual cognition, further research, and instruction in second language reading and writing.

Cummins' (1984) theories of the cross-linguistic interdependence of cognitive-academic skills imply that the literate knowledge used in demanding academic tasks is common across people's first and second languages. But it is not clear where demarcations are, psychologically, between the knowledge and skills which individuals use in their first and second languages. This distinction is vital for education in a second language, where precise understandings of learners' thinking processes are needed for accurate modeling in instruction. Little information is available documenting the processes of thinking which are common across first and second language performance in demanding academic tasks. What processes of thinking or aspects of knowledge actually transfer across languages? What processes, in turn, are specific to performance in a particular language? Might there be common knowledge which

applies in different kinds of academic skills? What does it entail?

The present study sought to explore these questions in relation to summary writing tasks, an instance of academic behavior where two distinct skills, reading and writing, are intimately interrelated (Hidi and Anderson 1986). Previous research on writing in second languages (Cumming, in press, see also Arndt 1987, Jones and Tetroe 1987, Raimes 1987, Sarig 1988) had indicated that problem solving strategies were an especially salient characteristic of writing expertise, appearing in second language writing performance in much the same way they do in mother tongue writing. Likewise, several analyses (Block 1986, Cohen 1986, Gunderson 1984, Hosenfeld 1984, Sarig 1987) of second language reading performance also suggested that similar thinking processes might obtain cross-linguistically in this skill (see Alderson 1984, Cohen 1986, Devine 1988 for recent reviews). Moreover, common elements in recent models of writing expertise (Bereiter and Scardamalia 1987), reading comprehension (Van Dijk and Kitsch 1983), translation (Dechert 1987), and verbal intelligence (Gardner 1983) suggest that common thinking processes might be found in these literate behaviors.

1 Related Research

What is known about the comparability of students' literate behaviors in their first and second languages? Recent research has asserted that composing processes are comparable across first and second languages (Cumming 1988, Jones and Tetroe 1987, Raimes 1987, Zamel 1983), but studies of reading in second languages have been less clear about cross-linguistic equivalencies. Some have concluded that:

> non-native speakers of English, reading in English, don't read like native speakers; they do not process text as native speakers do. (Carrell and Wallace 1983, p. 305)

> ...apparently limited control over the language "short circuits" the good reader's system, causing him/her to revert to poor reader strategies when confronted with a difficult or confusing task in the second language. (Clarke 1980, p. 206)

Others, in contrast, have found fundamental similarities:

> There did not seem to be a pattern of strategy use which distinguished the ESL readers in this study from the native speakers of English or which distinguished the native speaker of Spanish from the native speakers of Chinese. (Block 1986, p. 477)

> ...reading processes from the first language do appear to transfer to the foreign language (Sarig 1987, p. 118)

Conspicuously, the studies claiming to have found significant differences between first and second language reading or writing performance are open to two criticisms. One, they have used comparison groups which may not have been equivalent in their levels of literate expertise. An extreme example is Ostler's (1987) attempt to validate Kaplan's notion of "constrastive rhetoric" by comparing the ESL texts written by Saudi university students on composition tests with edited, published texts written by native speakers of English randomly sampled from a library. Similarly, Carrell and Wallace (1983) compare the reading performance of ESL students and mother tongue speakers of English, without matching groups for levels of reading skill or native language literacy. A second criticism is that these studies have used measures which assess very limited aspects of overall literate performance. The most frequently cited research on second language reading has used procedures such as miscue (Clarke 1979), cloze (Cziko 1978), or recall (Carrell and Wallace 1983) analyses, which provide very limited information about the principal psychological processes of reading for comprehension (see Johnston and Afflerbach 1985, Van Dijk and Kintsch 1983).

In contrast, empirical studies finding fundamental similarities in first and second language literate performance

have assessed reading or writing behaviors more holistically, tracing the overall processes of thinking and behavior involved. The most conclusive of these studies are the few which have used "within subjects" designs, comparing the performance of the same individuals in reading (de Serrano 1984, Sarig 1987), writing (Jones and Tetroe 1987), or summarizing (Sarig 1988) tasks in their first and second languages. Alternatively, a few studies have carefully grouped second language learners according to their levels of skill in reading (Block 1986) or writing (Cumming, in press, Raimes 1987) in their mother tongue to assess performance on these skills. All studies following these "grouping" or "within subjects" designs have, to date, found overall consistencies in reading or writing processes according to learners' levels of literate expertise -- not their second language proficiency.

A possible explanation for the discrepancies in these research findings appears in Cummins' proposal that general cognitive skills and second language proficiency are both major determinants of second language reading and writing performance. Empirical evidence for this distinction appears in Cumming's (in press) finding that adults' writing performance in their second language varies significantly with these two factors, but that each makes contributions which are psychologically distinct. Likewise, for reading in a second language, recent analyses by Devine (1988) and McLaughlin (1987) of the various psychological elements integral to text comprehension in a second language suggest that certain elements appear attributable to general literate skills, while others relate to second language proficiency. Within this framework, it is possible to see that studies claiming differences between first and second language reading performance (e.g. Clarke 1979, Cziko 1978) have assessed elements like lexical or syntactic knowledge, which pertain to linguistic details of second language texts but may play a minor role in the overall processes of deriving meaning from such texts (see Devine 1988).

Interestingly, the inter-relations of writing and reading performance in second languages have received virtually no consideration from this perspective. An exception is Sarig's (1988) case study of one individual performing 13 summary-writing tasks, which finds close correspondences between the cognitive processes the person used while reading and writing in his first and second languages. Otherwise, all other process-tracing research on second language performance that we are aware of to date has treated writing and reading as unique, different skills. Cummins' theories of the cross-linguistic interdependence of cognitive skills, however, suggest that general qualities of knowledge and cognitive processing apply across first and second language performance, not just those discretely related to skills such as reading or writing.

2 Methods

A "within subjects" design was used to compare reading and writing performance across first and second languages. In selecting participants, variation was sought in two factors: (1) levels of writing expertise in their mother tongue and (2) levels of proficiency in their second language. Otherwise, intervening variables, such as age, previous education, and cultural background, were controlled for in the selection of participants. Adults from common cultural backgrounds were studied so as to avoid confusion with issues of maturational development or socialization.

Fourteen Anglophone undergraduate students of French at a Canadian university volunteered to participate for a small stipend. Half of the volunteers had previously been placed (using grammar and aural discrimination tests) in "beginning" level intensive French classes, the other half in "intermediate" level classes. All participants were pre-screened to ensure that they had common ages (early to late 20s), as well as educational, linguistic and cultural backgrounds (i.e. Anglophone Canadians

educated in the same city). Preliminary questionnaires and interviews established that, in their mother tongue, 3 participants had experience writing professionally in their work, 4 were very "basic" writers with self-acknowledged deficiencies in reading and writing, and 7 were "average" students (without distinguishing literate expertise or deficiencies)1.

The participants, initially trained to think-aloud (following Ericsson and Simon 1984), were asked to read then summarize two challenging newspaper articles, one in English the other in French, at one week intervals. They were asked to write French summaries of the French text and English summaries of the English text, while thinking aloud. The texts, about 6 pages in length, had been carefully selected from English (1972) and French (1966) translations of the political journalism of Lenin (originally published in Russian in 1906). These were chosen to ensure equivalency of the passages in both languages and that the content of the readings would be sufficiently challenging to elicit a maximum number of problem solving strategies (see Johnston and Afflerbach 1985) in both languages. Unmodified English and French versions of the texts were presented, without identifying the author's name or other background information. The texts were randomly counterbalanced in order of presentation (i.e. using 4 translated versions of the two texts). Initial training and instructions were conducted in both English and French, so as not to bias which language participants would use for thinking-aloud.

The 28 think-aloud protocols were tape-recorded, transcribed, then coded, using a scheme from Cumming (1988) for decision making behaviors which displayed: (1) no problem solving; (2) problem identification without efforts at resolution; (3) rapid decisions without strategy use; and (4) problem solving strategies using heuristic searches (i.e. memory scan routines, directed translation across languages, generating and assessing alternatives, assessing in relation to a criterion, relating parts to a whole, or setting and adhering to a goal).

The written texts produced were rated by three raters for effectiveness in organization, content and language use -- using criteria from Jacobs, Zinkgraf, Wormuth, Hartfiel and Hughey (1981) as a 4 point scale. Inter-rater reliability was .8 between each pair of the three raters for the text assessments and .9 between two raters for the coding of problem solving behaviors.

3 Results

Individuals' uses of problem solving strategies proved to be highly consistent across their first and second language performance, as well as between their reading and writing in both languages (see Tables 1 and 2). The proportional frequency of higher-order strategy use correlated very highly (r from .9, $p<.0001$ to .6, $p<.01$) between reading and writing behaviors in English and in French. This correlated with individual's levels of writing expertise in their mother tongue (r from .9, $p<.0001$ to .5, $p<.05$), but not with their levels of second language proficiency.

--- Insert Tables 1 and 2 about here ---

Mean proportions of heuristic search strategies in the protocols mirrored participants' levels of writing expertise: about 60% for expert writers, about 30% for average students, and about 15% for basic writers. Participants with high levels of writing expertise used heuristic search strategies to resolve problems in 38% to 94% of their decision statements, while reading and writing in both languages. In contrast, participants with basic levels of writing expertise used heuristic search strategies in only 6% to 27% of their protocol statements. The "average student" group ranged between the two extremes, using explicit problem solving strategies in 12% to 50% of their reading and writing performance, though this figure decreased slightly (about 10%) in their second language.2 The ratings of the quality of participants' written texts correlated at lower,

but statistically significant levels (r = .7, p<.01 to .5, p<.05) with participants' levels of writing expertise, second language proficiency, and uses of problem solving strategies. Proficiency in French did not (as would be expected) correlate with qualities of the English texts. The number and distribution of participants in the study was not, however, sufficient to test Cummings' (1988) finding, using multivariate analyses, that the factors of literate expertise and second language proficiency acted as <u>separate</u> factors on the second language writing performance.

Qualitatively, the think-aloud data displayed similarities in problem solving processes in both languages and in the two skills of reading and writing3:

1. in statements with no problem solving, people reported on their impressions ("This is not something that interests me.") or behaviors ("I'm just rereading this.").

2. in statements where problems were identified but not evaluated further, a behavior characteristic of the "basic" writers, people attended to their knowledge lacks ("I don't know what this means", "I don't know what to write next").

3. in statements displaying rapid decisions but no reported strategy use, a behavior characteristic of the "average" students, people tended to summarize propositions ("So basically he's saying...", "I'll just write that...").

4. in statements using heuristic searches to resolve problems, a behavior characteristic of the "expert" writers, people tended to interrelate and assess complex ideas and language items ("So the whole article discusses who is for the "Duma" or for the revolution", "What does this word "Cadet" mean? He uses it here, and here, but it's not like the military. It must be another group of revolutionaries.")

The vast majority of reported thinking was in English, though all participants used some French in their thinking for the French task. Some participants with higher levels of proficiency in French appeared to use French more extensively and instrumentally while thinking in the French task, but this occurred too idiosyncratically to merit quantitative analyses.

4 Constructing representations

Individuals' approaches to reading and writing in both languages appeared to be fundamentally similar. The processes of reading which emerged closely resembled those described in detail by Johnston and Afflerbach (1986) as characteristic of constructing meaning from a challenging text. The processes of writing conformed to those documented in numerous studies of the cognitive aspects of composing (Bereiter and Scardamalia 1987, Flower and Hayes 1984). Neither process appeared to be affected substantially by the language of performance -- even for learners with only beginning levels of proficiency in French. All participants were able to derive the gist of both passages and to compose coherent texts in both languages. As suggested in previous studies of summarizing (reviewed in Hidi and Anderson 1986, Sarig 1988), writing and reading were closely integrated, focusing on establishing the gist of the given text. Nonetheless, each person's behavior divided neatly into phases of reading (rereading and some note taking) and writing (punctuated by occasional rereadings).

Generally, the information attended to in participants' thinking conformed to the model of discourse comprehension developed by Van Dijk and Kintsch (1983) (see also Schmalhofer and Glavanov 1986, Kintsch 1988). To perform this summary task, people constructed a mental model (Johnson-Laird 1983) of the significance of the texts, integrating (1) situational, (2) propositional and (3) verbatim representations of the available information. While reading, this mental model was updated and

revised on an ongoing basis as new information was processed and integrated into it at each of the three levels. While composing the summary, the mental model was further refined in view of its perceived correspondence to the passage and the need to state its most integral elements accurately. Attention to the three levels of representation occurred concurrently, for the most part, and thus could not, logically, be isolated for quantitative analyses.

The interactive quality of this process was most evident in people's initial approaches to the tasks. They attempted, quickly, to construct an overall representation of the situation the text referred to, inferring the significance of individual terms, propositions, and the relations they suggested:

> Oh, so "Tovarishch" is a newspaper. "Novy Put", it's not clear what that is. Is it a group of people or is it a newspaper? "In order to spread false reports"? Anyways, so "social democrats" are trying "to spread false reports about revolutionary social democracy" through newspapers like "Tovarishch". So that means that "social democrats" must be anti-social. What? Anti-social democracy? "Certain social-democrats". Not all, but "certain social democrats resort to bourgeois Cadet newspapers". "Certain social-democrats" attempt "to spread false reports about revolutionary social-democracy". Through "bourgeois" papers, i.e. "Tovarishch". Oh, so, "Novy Put" is a "Cadet" paper, is a paper. "Tovarishch" and "Novy Put" are both "Cadet" papers. But I don't know what "Cadet" is. (#5, English reading)

4.1 Situational representations

Efforts to construct a situational representation of the text while reading focused mainly on establishing the historical context of the given passage, the principal purpose of the text, the author's attitude toward the content and his intended readers, and the self-monitoring of one's own understanding of these issuess as well as their relative importance. While composing the summary, these processes continued, as a means of ascertaining the "right thing to say". These thinking processes

are illustrated in the following statements by participant #3 (see Table 1), who had some journalism experience and an "intermediate" proficiency in French.

> (#3, French reading) Hmm, I'm not too up on my French politics. They're speaking here about "rappelez-vous les socialistes français, dans le genre de" several names, "maintenant, avec Clemenceau à leur tête". If only I knew when he was in power, I'd know when this article was written.
>
> (#3, English reading) Okay, the author asks himself and his readers a question and he answers himself, "of course we are". He sure is trying to convince someone of something. The author obviously feels the revolution is necessary. Maybe the revolution hasn't finished yet, which would mean the article was written before 1917, or around that time.
>
> (#3, French writing) I think this is what the author himself is saying when he starts the paragraph on page 265, "Enfin, puisqu'on m'a obligé à me prononcer dans la presse". I think these are his own personal ideas. It's hard to say. Anyway, the important part is what he says, "Aucun bloc ni accord avec aucun autre parti ne sont admissibles pour les social-democrates". In other words, if what I think is right, the author doesn't think that social-democrats should be in line with any other party for any reason during the elections.
>
> (#3, English writing) I'm just asking myself if I should mention that the article is about newspaper articles written by these leaders. If it's important, I should mention the newspaper that he'd written in and the name of the articles that he wrote.

4.2 Propositional representations

A great deal of attention was devoted to interpreting individual phrases or sentences. People attempted to define or infer the sense of information in propositional segments. At times, this process proceeded in a "bottom-up" manner, piecing together relations between words, notions and characters. At other times, propositions were clarified by fitting them into a larger situational representation. In composing the summary, key

propositions were selected to serve as the focus for the content to be written down. These processes are illustrated by statements from participant #10 (see Table 1), an "average" student with "intermediate" proficiency in French:

> (#10, French reading) So, the newspaper refers to Mr. Martov for confirming? Giving information? "La fausse information", for confirming information, if it's true, false, for confirming false information that he gives to the "bolcheviks".
>
> (#10, English reading) Okay, so this guy, Plekhanov, has said in the newspaper, the Tovarishch, the Mensheviks, um, the Mensheviks want to have a "joint platform with the Cadets". But the Mensheviks themselves disagree with that in the Volkszeitung, which is unknown for the Russians and the Nasha Tribuna.
>
> (#10, French writing) Okay, we have Martov, is going against this guy, "réfutait" this guy "Tcherevanine". I don't understand what his motive is.
>
> (#10, English writing) Okay, so the fact that Plekhanov said they were going to have a joint platform with the Cadets means that they've given up their economic programs, I suppose.

4.3 Verbatim representations

Much attention was also devoted to the verbatim interpretation of words. This focused on unfamiliar terms or expressions in both languages. References to obscure terms like "Cadet", "Duma", or "Mensheviks" received much attention and were, interestingly, treated in a similar manner to unknown vocabulary in the second language. Inferences were often drawn about these terms from propositional or situational representations. In writing in both languages, similar processes were used to search, from memory, for an appropriate word to use to express an idea. These processes appear in the following statements from participant #2 (see Table 1), who had some experience writing reports in her work as well as a "beginning" proficiency in French:

(#2, French reading) "La lutte"? I guess it's "struggle" or something. That makes sense. (looks up word in bilingual dictionary) "Wrestling"? "Struggling"? Okay.

(#2, English reading) What is this "Duma"? The national assembly or something, I guess.

(#2, French writing) "L'idéologie"? Is that a word? "Ideology" in English. "L'ideology"? Mmm. I think I've heard that word before.

(#2, English writing) What's the word for that? "Participation"? "Compromise"? Not really. "Opportunistic". Oh, how do you spell that? It's in here somewhere. (looks through text) An "opportunistic" what? Mmm. No, that's wrong. (crosses line out)

5 Expert/inexpert contrasts

Differences in the qualities of thinking which did emerge appeared between the behaviors of participants with higher and lower levels of literate expertise. As suggested by Table 1, participants with high levels of literate expertise frequently used higher-order thinking strategies to resolve problems they encountered while reading and writing. Their less expert counterparts seldom did this. Participants with low levels of literate expertise tended to focus mainly at the verbatim and propositional levels of representing the texts, seldom showing efforts to construct an overall situational representation of the passages. While writing, their composing also appeared fragmented, dwelling on isolated notions, without an integrated sense of their intended discourse. In contrast, participants with high levels of literate expertise tended to work at interactively integrating information at all three levels of representation while reading. While writing the summary, they frequently referred to their overall situational representation to direct their composing and to evaluate the faithfulness of the propositions and words they conveyed in their summary texts.

These differences are most vivid when considering the most and least expert performances among the 14 participants. Participant #1, a published art critic, displayed especially skilled reading and writing. In addition, he was the only participant who possessed relevant background knowledge to support his interpretation of the passages. In contrast, participant #14 provided a distinctly unskilled performance, even though he worked intently on the tasks (for two hours in the case of the French task). Upon beginning the tasks he explained that he had been diagnosed as having reading and learning disabilities, though he was evidently capable of taking university courses. The qualities of thinking displayed by other participants varied between these two extremes.

The most distinctive characteristic of the more expert student was his facility for applying relevant knowledge to conceptualize the situational context of the passage. Fitting the passage into larger historical schemata, he was able to make informed interpretations based on background knowledge of the period in which the passage was originally written:

> This is very interesting, this part on the, um, the Mensheviks and the Duma, and supporting the Duma no matter what, and working within the system, because it reminds me that in the pre-World War One period, uh, among the, uh, Bolsheviks there was a split over the problem of whether to work through the party system or whether not to. And, uh, Lenin, for instance, split with a group of socialists who called themselves the Capri school but included a fellow called Bogdaniv and another called Maxim Gorki, and these people, uh. Maybe this is addressed to these people. I don't know. (#1, English reading)

He readily interpreted the gist and historical significance of the passages in both languages, even though he had only a "beginning" proficiency in French. He consistently aimed for a holistic understanding of the texts, adopting a distinct attitude toward the style and tone of the author. He seldom puzzled over individual propositions or terms. Instead, as he encountered

new information, he consolidated it into an overall framework of broader understanding and personal response:

> It's interesting too that he brings in, you know, that he brings in the historical precedent, with the situation of the republic without republicans in France and compares it to the situation with Vassiliev. I find this, I mean this sort of, um, satirical turn is, is very aggressive, very aggressive. And of course it's punctuated with exclamation marks and then questions. It's this didactic style that really, really bothers me at times. (#1, French reading)

The inexpert student, in contrast, treated the texts in a very fragmented way, even though he had an "intermediate" proficiency in French. He made associations between the notions he encountered and his own knowledge, but these seldom led to an overall interpretation, nor did he often relate them to one another:

> At the bottom of the footnote, "comrades". This does sound Russian. I've read, I have a friend who lived in Russia for several years, and he smuggled several English-translated books, Russian-translated books into English. That looks kind of familiar. (#14, English reading)

> "Le Cinquième Congrès". The fifth congress. I guess there's a congressional report, of the fifth congress. Where have I heard that lately? I know there's, yeah, yeah, yeah. Okay, just even try to remember what I've read in the newspapers lately. Yeah, that's right. What I'm referring to is the fifth congress. And, um, referring to what I've probably read in the newspaper about the summit coming up in Moscow of, uh, president Ronald Reagan, uh, with, um, Mikhail Gorbachov. Okay. Sidetracked. (#14, French reading)

He made efforts to employ several comprehension strategies, but these were mechanically applied to interpreting single words or rhetorical patterns. He failed to fit the information he derived into anything like an integrated propositional or situational representation:

> Okay, focus on the words that I understand so far from my French class. Like, "où". I know that. "Ou" is where. And "en" is a verb. That's probably another verb. (#14, French reading)

> I'm looking at the first page again, kind of skimming through, through the first page, that I haven't read yet, trying to pick out some words that I can figure out. "Troisième point". Ah, ha, third point. So there should be two other points then in the paragraph above, about Martov, this person. Martov, Martov, okay. What's the "premier et deuxième point"? Let's see. What is the "deuxième point"? Ah, ha, "deuxième". Okay, that's the "deuxième point". So there's one point missing. Okay. (#14, French reading)

The knowledge that the inexpert student was able to derive remained fragmented at the verbatim or propositional level -- disjointed from an overall conception of how the article's information could fit together into a conceptual whole:

> Let's see. Why am I having a hard time understanding this? I can identify key, some words. I can get the gist of what's going on. Right now, I'm skimming through the paper again. I start one idea, then I get frustrated with that, then I move on to a different idea. (#14, French reading)

Similar differences were evident in the two individuals' writing performance. The inexpert student wrote in fragmented units of thought, composing a phrase, then puzzling over the next one, never quite sure of how his ideas are integrated or should proceed. He vividly demonstrated "the what next strategy" which Bereiter and Scardamalia (1987) find typifies immature writers and Cumming (in press) found common among inexpert writers composing in their second language:

> I'm thinking about what else am I going to write, thinking, thinking, thinking. (#14, English writing)
>
> What else do I have to write? (#14, French writing)
>
> Oh, yeah, I have to find an idea. (#14, French writing)
>
> Um, my god, what else will I say? (#14, French writing)

In contrast, the expert writer worked from a clear conception of the content of the reading passage, never expressing difficulties about having to generate additional

information. His most problematic thinking episode while writing, in fact, occurred while first trying to sort out his goals for composing the summary (see Bereiter and Scardamalia 1987, Flower and Hayes 1984 for analyses of this characteristic of writing expertise). (No purpose for writing the summary was specified in instructions for the tasks.) As in reading, he seemed primarily concerned about forming a situational representation to guide his composing:

> It's very strange to write about something when, you know, you ask me to write about it and, uh. Who am I writing to? I'm used to writing papers, you know, when I have an audience to write to. This, I don't have any audience to write to. I'm no better off than... Well, this guy definitely knows his audience, but in a sense I'm no better off writing about this than reading about it. In a sense, the two of them are equivalent because there's no sort of reference between outside of, um, sort of my orbit, so to speak. (#1, English writing)

While composing the summary in French, the expert student was confident of the ideas he wished to convey, but he was frequently perplexed by his lack of relevant lexical and syntactic knowledge:

> I'm very aware of the gap between what I would like to say and what I'm thinking and what I can write. There's a real self-consciousness of a, of a gap there. And, uh, you know, I find myself in the sentence and I have to stop because I don't know the word exactly that I want to sue and, uh, things of that nature. It's very, very difficult in that way. (#1, French writing)

In contrast, the inexpert student composed with relative fluency, hardly aware of any limitations in his linguistic proficiency. Indeed, he attended more frequently to linguistic issues while writing in his mother tongue:

> I can't believe how much I'm writing on this. This is ridiculous. I don't know French, but I'm writing a lot. (#14, French writing)

> Oops, I made a mistake. The verb "divide", is "division". (#14, English writing)

6 Implications

The thinking processes involved in reading and summarizing a challenging text in one's second language appear to be fundamentally similar to those involved in reading and summarizing a challenging text in one's mother tongue. The present analyses indicate that educated adults tend to use equivalent problem solving strategies while performing challenging reading and writing tasks in their first and second languages. The frequency and qualities of this cognitive strategy use relate closely to the literate expertise people have developed, an expertise which appears to be enacted through similar thinking processes in reading and writing alike. Nonetheless, it should be noted that the thinking strategies which do transfer cross-linguistically have, as Sarig (1987) concludes from a similar study, highly individualized characteristics. The quality of summary texts produced in a second language is directly related to these thinking processes, though it is also related to people's levels of proficiency in the second language, as suggested by Cummins' (1984) theories and demonstrated in other studies of second language writing (Cumming, in press).

This research was limited to the study of a small number of individuals in only two tasks. But its findings concur with the few other research studies which have used "within subjects" designs to compare individuals' strategies and thinking cross-linguistically -- in reading (de Serrano 1984, Sarig 1987), writing (Arndt 1987, Jones and Tetroe 1987), and summarizing (Sarig 1988). Each of these studies of performance on cognitively-demanding tasks has found that individuals use thinking processes which are fundamentally similar in their first and second languages, drawing on the knowledge and skills they have developed in that specialized domain. Further research is needed on individuals performing in a variety of specialized domains, such as writing, mathematics, or physics4, to determine

the extent to which the transfer of thinking strategies may vary with greater or lesser expertise, relevant knowledge, and individual characteristics.

These findings and areas for future research can be interpreted in view of psychological theories (e.g. Gardner 1983) which propose that people develop specialized intelligences in areas of unique expertise. The thinking processes which characterize such expertise appear to transfer cross-linguistically in cognitively-demanding tasks, much as Cummins (1984) proposes. This may be because effective reading comprehension entails general reasoning (Thorndike 1974) or inferencing (Frederiksen 1979, Davey and Macready 1986) skills. These may be related to a general verbal expertise, which is integral to writing performance as well (Gardner 1983). However, as the qualitative analyses above suggest (see also Sarig 1987), this involves a complex interaction of knowledge and skill, not simply one attribute. Effective comprehension in the present task required the intentional construction of complex, interactive mental representations of the information in the texts, in conjunction with higher-order problem solving strategies. Moreover, optimal performance appeared to require the application of some relevant knowledge or schemata to form appropriate situational representations, in addition to composing skill and self-control.

The thinking processes which appeared to transfer across first and second languages were all those involved in "transforming knowledge" (Bereiter and Scardamalia 1987, Kintsch 1988). Simple parsing of <u>propositions</u> or the <u>verbatim</u> interpreting of words were integral to this process, but they were only part of a larger cognitive process necessary to form a full mental model of the <u>situational</u> significance of the text. Participants with high levels of literate expertise were able, using higher-order problem solving strategies, to integrate their representations at all three levels. In the second language, knowledge of French syntax and lexis facilitated the construction

of propositional and verbatim representations. But second language proficiency offered little toward developing an appropriate situational representation, nor could it help to guide learners toward integrating all three levels of representation (for related findings see Haynes 1984, Sarig 1987, 1988, Strother and Ulijn 1987). The centrality of literate expertise in this process goes some way toward clarifying how its development in a first (Cummins 1984) or second (Elley and Mangubhai 1983) language has a strong impact on the academic achievement of students in their second language. Conversely, this may explain why evaluation of learners' summary texts in a second language has proved to be an unreliable indicator of their proficiency in that language (Cohen, in press, Johns 1985).

The thinking processes documented here appear to be readily "teachable", using the kinds of modeling and prompting procedures outlined for reading by Brown, Palinscar, and Armbruster (1984) or for writing by Bereiter and Scardamalia (1987). Training studies, as in Hosenfeld (1984) or O'Malley (1987), are needed to assess the extent to which learning these thinking strategies can affect second language performance and learning. Though the reading passages selected for the present study were certainly challenging for all participants, the passages appear comparable to those that university students working in a second language may actually encounter in reading for academic courses.5 This would suggest that instruction in reading and writing in second languages can profitably aim to develop the higher orders of thinking characteristic of more expert problem solving. Second language instruction aimed solely at syntactic or lexical knowledge may facilitate some processes of reading comprehension, but learners performing academic work in their second language need to develop extensive thinking and conceptualization strategies to be able to use such knowledge to comprehend challenging texts effectively.

The present analyses of the mental processes of reading and summarizing suggest that more thorough, holistic descriptions of

learners' thinking while reading and writing are needed to understand second language performance in challenging literate tasks. Much previous research on second language reading has used procedures such as oral miscue analysis, cloze responses, or recall protocols -- procedures which assess only partial aspects of the thinking which is integral to this skill. This has promoted a depreciated impression of second language reading as a "guessing game", rather than the complex, intentional process of constructing mental representations which people actually perform. Methodologically, the present study also demonstrates the merits of "within subject" designs in second language research. Having research participants serve as their own "controls" (by performing in their first and second languages) eliminates the need to seek comparisons with separate control groups. These are inherently difficult to match for equivalency in literate skills or culturally specific knowledge, resulting in potentially misleading interpretations of how first and second language performance compares.

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-- Notes --

1. Participants completed questionnaires rating their writing skills in their mother tongue in a variety of situations, such as writing letters to friends, business letters, or short and long reports at university or work. The questionnaire was validated in earlier studies (Cumming 1987, 1988), where it proved to correspond almost precisely (r =.9) to direct assessments of written texts. On a scale of 1 to 5, professionally experienced writers rated themselves at 5, basic writers rated themselves at 1 or 2 for all situations, and "average" students rated themselves between these extremes.

2. This decrease seems attributable to the language proficiency of the "average" student group, who were overrepresented by beginning level French students. The single intermediate level French student showed a dramatically higher proportion of heuristic search strategies in her French performance. This suggests that there may be an interaction between second language proficiency and literate expertise for "average" student writers in these tasks, an interaction which does not appear for people with high or low levels of literate expertise. Similar results appeared in two earlier studies of ESL writing with different populations (Cumming, 1988, 1987), suggesting that this issue needs to be assessed more thoroughly in future research.

3. Words or phrases appearing in quotation marks indicate that they are being read from the source text. Otherwise, transcription conventions follow standard punctuation for dialogue.

4. For research on bilingual performance in other domains, see Dave's (1983) study of mathematical reasoning and Johnson's (1987) study of the interpretation of metaphors.

5. For instance, it is quite conceivable that the passages selected for the present study could be required reading for a course on Russian History or Political Science.

Table 1. Percentage of Decision Statements Using Heuristic Search Strategies

	English Task		French Task	
	reading	writing	reading	writing
expert writers x =	59%	50%	57%	65%
1.(beginning French)	94%	92%	94%	67%
2.(beginning French)	26%	19%	32%	64%
3.(intermediate French)	56%	38%	44%	63%
average writers x =	36%	35%	19%	17%
4.(beginning French)	37%	44%	13%	13%
5.(beginning French)	32%	#	24%	17%
6.(beginning French)	35%	30%	19%	18%
7.(beginning French)	43%	30%	10%	7%
8.(beginning French)	50%	50%	40%	#
9.(intermediate French)	43%	#	12%	#
10.(intermediate French)	14%	23%	12%	30%
basic writers x =	16%	16%	12%	10%
11.(beginning French)	27%	20%	27%	3%
12.(intermediate French)	13%	25%	9%	20%
13.(intermediate French)	18%	9%	6%	10%
14.(intermediate French)	6%	9%	6%	6%

= missing data (technical problems with tape recorder)

Table 2. Correlations of Heuristic Search Use in Reading and Writing Segments with L2 Proficiency, Writing Expertise, and Ratings of Compositions

	English Reading	English Writing	French Reading	French Writing	L2 Prof.	Writing Expert.	French Text
English Writing	.9***						
French Reading	.9***	.9***					
French Writing	.6**	.6**	.8***				
L2 Proficiency	-.1	-.3	-.2	.3			
Writing Expertise	.4	.5*	.6**	.9***	0		
French TextRating	.4	.3	.5*	.7**	.6**	.5*	
English Text Rating	.5*	.5*	.4	.6**	.3	.5*	.4

*** = p <.0001, ** = p <.01, * = p<.05